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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

RE:	Patent Application for	)	Date:	28 June 2001
Inventor(s):	Kris Nyhus	)	Art Unit:	1638
Serial No.:	09/811049	)	Examiner:	Mehra
Filed:	March 15, 2001	)		
Title:	INBRED CORN LINE G4901	)	Action:	INFORMATION
		)		DISCLOSURE

TO: The Commissioner of Patents and Trademarks  
Washington, DC 20231

Sir:

The documents identified on the attached for PTO-1449 have come to the attention of the undersigned in connection with the subject application. Copies of these documents are also attached, unless otherwise indicated below, and it is respectively requested that they be made of record in this proceeding. The identification of these documents is for the purpose of meeting Applicant's duty of disclosure under 37 C.F.R. 1.56 and is not intended to be an admission that any of these documents constitute prior art as to the invention disclosed in the subject application.

REFERENCES

Coe, E.H., Jr. and M.G. Neuffer, The Genetics of Corn, pg. 111.

Conger, B.V., F.J. Novak, R. Afza, and K. Erdelsky, "Somatic embryogenesis from cultured leaf segments of *Zea mays*", Plant Cell Reports, 6:345-347, (1987).

Duncan, D.R., M.E. Williams, B.E. Zehr and J.M. Widholm. "The production of callus capable of plant regeneration from immature embryos of numerous *Zea mays* genotypes", Planta, 165:322-332, (1985).

Edallo, et al., "Chromosomal Variation and Frequency of Spontaneous Mutation Associated with in Vitro Culture and Plant Regeneration in Maize", Maydica XXVI, pp. 39-56, (1981).

Forsberg, R.A. and R.R. Smith, "Sources, Maintenance, and Utilization of Parental Material", Hybridization of Crop Plants, Chapter 4, pp. 65-81, (1980).

Green, C.E. and R.L. Phillips, "Plant Regeneration from Tissue Cultures of Maize", Crop Science, vol. 15, pp. 417-421, (1975).

Green, C.E. and C.A. Rhodes, "Plant Regeneration in Tissue Cultures of Maize", Maize for Biological Research, pp. 367-372, (1982).

Hallauer, et al, "Corn Breeding", Corn and Corn Improvement, pp. 463-564 (1988). Sprague et al, eds.

Lowe, Keith, Patent Application 0 160 390.

Meghji, M.R., J.W. Dudley, R.J. Lambert, and G.F. Sprague, "Inbreeding Depression, Inbred and Hybrid Grain Yields, and Other Traits of Maize Genotypes Representing Three Eras". Crop Science, vol. 24, pp. 545-549, (1984).

Phillips, et al., "Cell/Tissue Culture and In Vitro Manipulation", In Corn & Corn Improvement, 3rd Ed., ASA Publication, #18, pp. 345-349 & 356-357, (1988).

Poehlman, John Milton, "Breeding Field Crop", AVI Publishing Company, Inc., Westport, Connecticut, pp. 237-246, (1987).

Rao, K.V., et al., "Somatic Embryogenesis in Glume Callus Cultures", Osmania University, Hyberabad, India.

Sass, "Morphology", In Corn & Corn Improvement, ASA Publication, Madison, WI, pp. 89-109 (1977).

Songstad, David D., David R. Duncan, and Jack M. Widholm, "Effect of 1-aminocyclopropane-1-carboxylic acid, silver nitrate, and norbornadiene on plant regeneration from maize callus cultures", Plant Cell Reports, 7:262-265, (1988).

Tomes, et al, "The Effect of Parental Genotype on Initiation of Embryogenic Callus from Elite Maize (*Zea mays* l.) Germplasm". Theor. Appl. Genet. 70., pp. 505-509, (1985).

Troyer, et al., "Selection for Early Flowering in Corn: 10 Late Synthetics", Crop Science, vol. 25, pp. 695-697, (1985).

Umbeck, et al., "Reversion of Male-Sterile T-Cytoplasm Maize to Male Fertility in Tissue Culture", Crop Science, vol. 23, pp. 584-588, (1983).

Wright, H., "Commercial Hybrid Seed Production", Hybridization of Crop Plants, pp. 161-176, (1980).

Wych, R.D., "Production of Hybrid Seed Corn", Corn and Corn Improvement, pp. 565-607, (1988).

The Commercial Hybrid Seed Production article written by Wright is provided because it gives a variety of practical aspects of commercial production of hybrid seed. This article includes corn which is monoecious species that is naturally pollinated by wind. The paper also discusses obtaining the seed of parent lines, field selection and isolation techniques.

The article on Corn Breeding written by Hallauer generally goes through a bit of the history of the development of corn germplasm. The article also goes through a variety of breeding procedures used to develop and improve new lines. Breeding methods included in this paper include: methods for line development, pedigree selection, backcrossing gamete selection, special techniques for instantaneous derivation of homozygous inbred lines, and general methods of converting early lines to late lines and developing inbred lines. This article is provided for the general overview of breeding of corn.

The article on Cell/Tissue Culture and In Vitro Manipulation basically goes through corn cell and tissue culture initiation, maintenance and plant regeneration. These pages also teach about the various culture medium the various stages of the tissue culture process. This article is a general outline on producing somaclonal regenerated plants or variance thereof.

The article by Meghji, M.R. describes Inbreeding Depression in Corn. This article generally reviews the improvement of maize hybrids over a 40 year period. This article notes that substantial improvement in inbred and hybrid yielding ability occurred in a 20 year period prior to 1970.

The article by Conger on Somatic Embryogenesis from Cultured Leaf Segments of Zea Mays discusses somatic embryos which were derived from calli produced from cultured meristematic tissues such as immature embryos on leaves. This article specifically is reporting that somatic embryos have been formed from cultured leaf segments of corn. The Examiner's attention is drawn to the fact that the article clearly does a step-by-step analysis of this regeneration.

The article by Rao from Hyderabad, India on Somatic Embryogenesis in Glume Callus Cultures reports that callus induction and plantlet regeneration from glume have been made possible.

The article by Songstad on the Effects of Silver Nitrate outlines a large increase in plant regeneration that is associated with treatment of certain chemicals. Generally, this article indicates that there is a large increase in efficiency in plant regeneration with chemical use.

The article by Duncan on the Production of Callus basically outlines that tissue culture techniques are now available to obtain callus cultures capable of plant regeneration from immature maize embryos from most types of maize genotypes. The article notes that inbreds such as B73, Mo17, B84, A632, A634, Ms71, W117, H99 and H95, and Cm105 were all capable of being regenerated.

The article by Poehlman on Breeding Field Crop is brought to the Examiner's attention specifically the note on page 239 regarding the effects of inbreeding in a homozygous population. This article reports a method of outlining which procedures are used to arrive at what the industry refers to as an inbred plant. Note the hybrid vigor analysis shown in Fig. 12.2.

The articles by Green just reemphasizes the ability in the art to develop Plant Regeneration Of Tissue Culture and that the ability to develop this type of tissue in cell cultures

has greatly increased in recent years. The Examiner's attention is brought to the fact that there is a materials and methods section for practicing plant regeneration from cell cultures taught in the Green article.

In the article reprinted from Maize for Biological Research, it states in genetic analysis only 9 cytologically abnormal plants were found among 277 by meiotic analysis of pollen mother cells in young tassels. The article also indicated that older tissue cultures may have more abnormalities than newer tissue cultures.

The next article that is brought to the Examiner's attention is by Sass. This paper is on the development of the embryo. This article gives an in-depth review of the histology in the vegetative plant body.

The first page of the Genetics of Corn by Coe simply outlines that there is uncommonly great genetic variability under first lines varieties and races of corn in the world. Although this variety is hard to examine, uniform factors have been identified which determine color forms, structure constitutes, or processes in every part of tissue. It is difficult to catalog the detailed genetics of corn. This article is presented to the Examiner to show that there is a variety of corn and they differ substantially one from another.

The Troyer paper basically has to do with Selection for Early Flowering in Corn. This article indicates that a variety of different problems are associated with development of early flowering including broken stalks, yield, and variety of old age diseases. This article is brought to the Examiner's attention to show the difficulty in developing an early season hybrids.

The article from Crop Science on Male Sterility is basically of general interest to the Examiner. This article basically shows there are a number of problems that have been associated with diseases, male sterility, and how these problems have been addressed.

The article on The Effect of Parental Genotype on Embryogenic Callus is provided for the Examiner as a general teaching. The tissue and cell culture can be used for propagation of complete plants from genetic transformation of individual cells such as protoplast. The Examiner's attention is brought to page 506 where it is noted that all inbreds and hybrids used in this study had mature embryos that were capable of embryogenic response after 14 days in the culture. The frequency of the responses were different but all were capable.

The Patent Application 0 160 390 with Keith Lowe as the inventor describes and teaches a person of ordinary skill in the art how cell suspensions give rise to the embryos under certain culture conditions. This article also shows how B73 can be regenerated from these cell suspensions according to the teaching of the invention and how corn plants can be regenerated. This paper is provided to show that a person with ordinary skill in the art has teachings on how to regenerate maize.

The Production of Hybrid Seed Corn by Wych is a 1988 paper which reviews how hybrid seed corn is produced. This paper is of general interest and the Examiner's attention is generally drawn to maturity and seed quality on page 587. This article is supplied to show that there is

some chromosomal variation of frequency of spontaneous mutation in some in vitro culture and plant regeneration of maize but that it is not the norm.

Enclosed is an article by Edallo which reviews chromosomal variation and frequency of spontaneous mutation of in vitro culture and plant regeneration. The paper reviews the ploidy of the tissue cultures and the ploidy and pollen sterility of regenerated plants and their progeny. Table 5 of the article shows the mutations observed in these plants. This article shows what variations can be seen in some cultures.

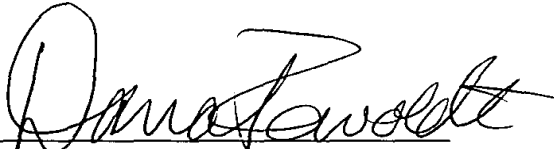
The Chapter 4 on Sources, Maintenance and Utilization of Parental Material is provided as a general review of material. Page 74 indicates that parental characteristics may influence specific lines. Page 76 discusses hybrid vigor and the first pages lists various sources of germplasm. The reference is for the Examiner's general review.

It is believed that there has been no disclosure of the invention as claimed. Accordingly, examination of the claims on the merits and allowance of the application as filed are earnestly requested.

Respectfully submitted,

Date:

June 12, 2001

  
**Dana S. Rewoldt**  
**Registration No. 33,762**  
**ADVANTA USA Inc.**  
**2369 330<sup>th</sup> Street**  
**Box 500**  
**Slater, IA 50244**  
**Telephone: (515) 685-5101**

ATTORNEYS FOR APPLICANT



**CERTIFICATE OF MAILING UNDER 37 C.F.R. 1.8**

I hereby certify that the attached INFORMATION DISCLOSURE and PTO Form 1449 are being deposited with the United States Postal Service as first-class mail in an envelope addressed to The Commissioner of Patents and Trademarks, Washington, DC 20231, on this 28 day of June, 2001

A handwritten signature in black ink, appearing to read "S. D. [unclear]".